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W^m Cooper.

EASY RULES
FOR
TAKING A LIKENESS
BY THE
MOST PRACTICABLE PRINCIPLES
OF
GEOMETRY AND PERSPECTIVE:
WITH
VARIOUS ANALOGOUS FIGURES.

WRITTEN IN FRENCH
By ABBÉ *BONAMICI*,
To ſerve as a Supplement to the French Encyclopœdia:
TRANSLATED INTO ENGLISH
By ABBE' *ADAMS*.

In nova fert animus, ſimulatas *dicere formas*.

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ADVERTISEMENT.

25.4.17.

As the French Encyclopœdia of Arts treating upon Painting, does not give the method of taking likeneſſes, becauſe painters, it ſays, have laid down no particular rules on the ſubject; on this account the Author, from his knowledge and experience in this line, thinks he may ſerve the Public, and above all the lovers of Painting, by communicating his method and ſyſtem, founded on the eaſieſt and ſureſt principles: and as he has finiſhed in England his work written in Italian and French, he now publiſhes it tranſlated into Engliſh, and intends to print it again in French, ſhould the preſent attempt be well received by the Public.

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PREFACE.

THE art of taking the likeneſs of a perſon is ſo difficult, that even the moſt expert in drawing find that it is not eaſy to ſucceed, and often fail in the attempt.

Many will form a very regular head, give it fine colouring, an agreeable ſhape, and produce a pretty painting; but they loſe ſight of the reſemblance, which ſhould be the main object of their labour.

Others make many trials to catch ſome likeneſs, and after doing, and undoing, changing the light and poſition, and long repeated ſittings, make a picture which ſhows more work than truth. This has made ſomebody ſay of an excellent painter who ſucceeded very ill in his likeneſſes, that *he made bad portraits, and good pictures.*

This difficulty has ever ſubſiſted. Pliny the Younger, writing to a friend, whom he charges to procure a copy of a portrait, tells him, that, *if it is difficult to catch the air and likeneſs of a perſon in taking his picture, it is ſtill more difficult to copy a good portrait; wherefore I entreat you,* adds he, *not to ſuffer the painter to ſwerve the leaſt from the original, even though it be to make a more beautiful picture.* "Cum eſt "arduum ſimilitudinem effingere ex vero, "tum longe difficillima eſt imitatio; a qua "rogo ut artificem quem elegeris, ne in "melius quidem ſinas aberrare." Yet we ſee painters who, without poſſeſſing great abilities in deſigning, take a good likeneſs with leſs difficulty than others, though better draughtsmen than themſelves, and are for this reaſon preferred by thoſe who like a perfect reſemblance better than a pretty picture.

This being the caſe, what can be the reaſon of this difficulty ſome do, and ſome do not find, though leſs able draughtsmen? Some aſſert likeneſs to be the mere effect of imagination, which is ſtronger in ſome than in others, whilſt fine painting is the reſult of art. This anſwer is not at all ſatisfactory; becauſe it ſeems not natural that an artiſt capable of executing an original painting of a well-choſen ſubject, the figures being well diſtributed, the colouring good, ſhould not have powers of imagination equal to produce a good likeneſs: ſecondly, the ſight being more lively than the imagination, he that cannot take a likeneſs by ſight, will not be able to effect it by imagination.

This ſeems to me to be the moſt rational ſolution of the queſtion: we find that, from the earlieſt date of the knowledge of painting, the moſt exact rules were laid down for drawing a human body with all its muſcles, and changes formed by every attitude. In regard to the head in particular, directions are given, not only reſpecting its proportions, but to diſtinguiſh the difference of ſex and age, the head of a man from that of a woman, of the aged from that of the child. Thus excellency was acquired, becauſe the artiſt there found a ſure guide to work with exactneſs: the ſame artiſt, not finding the ſame directions in taking likeneſſes, proceeds at random, and beats out his way like one in the dark, who ſees not his road. But if by chance, and the habit of practice, ſome frequently catch a reſemblance, they do it by certain ſecret rules, which the powers of practice may produce; and having found them ſometimes ſucceſsful, they adopt them for general uſe; not abſolutely to ſay that ſuch likeneſſes are the reſult of chance.

But if it muſt be allowed certain ſecret rules are neceſſary, how comes it that no one has yet brought them to light, and penned them down, to ſatisfy the curioſity of the Virtuoſi, and of artiſts themſelves? as the French Academy notices in the Encyclopœdia of Arts. I will anſwer the queſtion, as I take the caſe to ſtand. Amongſt ſuch rules as might be aſſigned, there are ſome a little ſpeculative; conſequently are difficult to ſtate, without abſtract, long, and tireſome diſcuſſions: now, on the ſcore of this difficulty, I believe no one has been inclined to handle a ſubject liable to imperfections, for want of rules hard to be explained. To eſtabliſh then rules for taking a likeneſs, we muſt ſurmount this obſtacle, and examine if there be any practicable principles, and mechanical directions, to ſupply the defect of theory, and attain this end. Such is the ſubject of my work, in which I propoſe giving a ſpecial ſyſtem of thoſe practical directions, which, without the aid of more ſpeculation, will be ſufficient to produce a perfect likeneſs; as will appear by the demonſtrations I will hold out.

I am well aware that I am ſetting forth a work, which, as it may pleaſe, may alſo be criticiſed ; but, as ſome lovers of the art, and friends, upon the conviction of my experience, application, and facility of execution, have entreated me to write on the ſubject, I do it with pleaſure the beſt I am able ; and to cover myſelf from criticiſm, I premiſe the two following remarks. The firſt, I preſume that thoſe who read theſe rules to follow them, are not able deſigners : it is to encourage theſe, that I will ſhew a method, the moſt eaſy, to make a head by one certain rule, which will hold good for making others, which, having the ſame lines, will alſo have the ſame likeneſs ; as will appear by the figures I will form.

The ſecond remark is, that I mean not to lay down rules of drawing, not only becauſe my directions regard the head alone, and are ſuſceptible of variation according to different figures, but alſo becauſe they would be needleſs after ſo many publications on the ſubject. On this very account, I confine myſelf to thoſe lines alone that are neceſſary to form a likeneſs; and I ſpeak more like a mathematician than a painter.

From theſe premiſes ariſe two things: the firſt, the lovers of the art, ſeeing a road opened to attain their views, and which ſeems impracticable without great labour and ſkill in drawing, will be pleaſed with me, eſpecially when they behold their ſucceſs; the ſecond is, that painters, ſeeing I enter not into their profeſſion further than what regards a likeneſs, and even that this reſtriction to likeneſs is treated ſometimes according to the rules of Geometry, ſometimes according to thoſe of Perſpective, will find, I believe, no room for their criticiſm. In a word, I hope every reader will receive the work with indulgence; firſt, on account of its novelty, ſince it may be ſaid I have opened a way hitherto untrod, *novum iter ingredior*; ſecondly, on account of my eager deſire of facilitating unto others that may come after me, the means of making a better work; as it is eaſy, according to the old ſaying, to perfect an invention—*facile eſt inventis addere*.

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EASY RULES, &c.

25.4.17.

FIRST PART.

Fundamental Rules to learn to take a Likeneſs.

AS in every art or ſcience it is neceſſary to learn the firſt principles and elements, which are the baſis and ground-work of each art and ſcience, ſo here is it neceſſary, according to my plan, to know how to draw a perfect ſquare, and to divide it into ſixteen equal parts, becauſe the ſquare, with its diviſions, is the baſis of this art.

To do this, take the following rules.

FIRST RULE.

Let the line A B be one ſide of the ſquare you ſeek: open the compaſs from A to B; and making the centre in A, deſcribe a portion of a circle B C; then make a new centre in B, and draw the circular portion A D; then, from the point of the ſegment E, tranſport one half of the curve A C to C, and to D; thus you will have the points D C to draw ſtraight lines from D to B, and from C to A, and from D to C: thus the following figure will exhibit a perfect ſquare. Fig. 1.

SECOND RULE.

Make a circle A B C D; draw the diameter A B; then, with the ſame opening of the compaſs, making centre in A, form the ſegment E, and taking centre in B, form the ſegment F; and fixing your centre in both ſegments, raiſe two ſmall portions of a circle in G: their ſection will ſhow the place of the perpendicular, which, paſſing through the centre, will divide the circle into four parts. Next, take your centre in C; and, on one ſide and the other, make a ſegment, till it unites with the firſt ſegments, E, F; and doing the ſame in the lower part of the circle, you will have the four points, that form the four ſides of a perfect ſquare, as appears in the ſecond figure. Fig. 2.

To divide a Square into ſixteen parts.

I look upon the ſecond rule as more uſeful than the firſt in forming a ſquare; as it gives, at the ſame time, the exact points for dividing it into ſixteen equal parts: for having made a figure like the ſecond, but without marking in black lines either the circle, or its ſegments, draw four other lines from one ſegment to the other; and the ſquare which was only divided into four, will now be perfectly divided into ſixteen, as appears in the Third Figure.

The Uſe of the Square to make a Head.

To know how uſeful a ſquare divided into ſixteen parts, is to draw a head with exact proportion, without ſpeaking now of likeneſs, it is ſufficient to view the head contained in the Square of the Fourth Figure; for, on the firſt caſt of the eye, there appears the whole proportion it ought to have, following the rules aſſigned according to the principles of drawing; and moreover, ſuch limitations, both for the contour and inner parts of the head, are ſo viſible, that it is impoſſible to err in making another head by it, though one may never have learned the principles of drawing: and ſurely, if, without knowing any other rule, it is eaſy to trace each particular line found in each little ſquare, it is equally eaſy to trace the whole collectively contained in the great ſquare, becauſe the proportion of each part makes the proportion of the whole. But this general facility of making a head is not ſatisfactory, according to my ſyſtem, unleſs particular and more preciſe rules are given to limit each part of the face to each diviſion of the ſquare. This I will do in the two following Sections: in the firſt I will treat of the external contour of a face viewed in profile; in the ſecond, of the inner parts of the ſame viſage.

The external Contour of a Face in profile.

In a ſquare divided into ſixteen parts, as in the Fifth Figure, the three little ſquares, 1, 2, 3, give the three equal diſtances of a regular face. In the firſt is ſeen the forehead; in the ſecond, the noſe; in the third, the mouth and chin.

The forehead is within the line; the noſe paſſes it; and the chin and mouth remain within it. How much each part muſt jut out beyond or keep within the line, will be ſeen by obſerving the meaſure of ſometimes one fourth, ſometimes one third, of the little ſquare marked out in the figure. The forehead then may begin at the fourth upper part of the little Square 1, and deſcend to the fourth lateral quarter of the ſame ſquare. The line for the noſe is reſumed at the firſt mark of the Square 2, and will advance outwards one third of a ſquare, and return inwards at the angle of the Square 3. The mouth is made diſtant from the noſe one third of the Square 3, and forms itſelf within it one fourth for the hollowing of the chin, which deſcends with a round to the extremity of the Square 3. Next, from the beginning of the forehead

head the head is formed with a round riſing two thirds of the Square 4; and, deſcending, it goes a little out of the Square 5, and returns within the Square 6, dividing it in the middle: and this line, with the line that ſeparates the great Square, gives the thickneſs of the neck, as is ſeen in Fig. 5.

The Inſide of the Profile.

Having thus formed the external part of the Profile according to the rules juſt laid down, the firſt and hardeſt thing to be done is the eye, as well in regard to ſhape as ſituation; for which I give the following rule.

In the middle of the little line that ſeparates the Squares 1, 2, bring down the oval pupil in length one quarter of the Square; and where the pupil joins the line of the Square, bring down obliquely the upper lid, to which the lower lid unites in a point near the middle line. One fourth higher is formed the eyebrow, which is thicker in the begining near the line, and ſmaller as it deſcends to the corner. Between the eyelid and the eyebrow a curve is drawn, to indicate the fold made by the ſame eyelid when it opens: thus the eye will be formed, as appears in the figure.

Another thing within the Profile is the ear, which muſt be placed in the Square 4. Its length is one ſquare to correſpond betwixt the eye and the extremity of the noſe: its width is one half of a ſquare above, and leſs below, terminating at the angle where it joins the jaw-bone. Its external and internal configuration is as is ſeen here, without being too minute on a ſubject of no great conſequence to a likeneſs.

The width or end of the mouth anſwers perpendicularly to the pupil of the eye; and the noſtril, which ends with a round, lies perpendicularly under the beginning of the eyebrow, as appears marked by little dots.

The joining of the hair to the forehead, and on the ſide of the ear, is done more or leſs, as the figure ſhews. Fig. 6.

I have diſplayed theſe rules, not only with preciſion, but with ſome ſingularity perhaps; becauſe in this preciſion and ſingularity conſiſts the very ground-work of my ſyſtem of taking with certainty an exact likeneſs. For this reaſon, I begin with the profile, as the beſt way to make a fuller face, as the ſequel will ſhew.

Wherefore, thoſe who wiſh to know how to take a likeneſs, muſt obſerve theſe rules, and often exerciſe themſelves in drawing faces in a ſquare, like thoſe above, in order to acquire facility and expedition.

If you wiſh to change any thing, it is done, in regard to the external contour, by obſerving always the principal proportions, viz. If we ſaid the forehead begins at the fourth part of a little ſquare, you may begin it at the half: if we ſaid the noſe ſhould advance forward one third of the ſquare, let it project one half or one quarter only: if we ſaid that the chin reenters one quarter, let it be a third, or a half. Thus the difference betwixt this and other faces will ſhew itſelf, and this diverſity is founded in nature. I will produce infinite more examples in the ſequel.

Now, as I propoſed to treat this ſubject more according to the laws of mathematics, than thoſe of painting, I will borrow from mathematicians the ſame order they uſe in treating their ſubjects, beginning by the names of things, and paſſing gradually to axioms, propoſitions, demonſtrations, and corollaries, and that with the greateſt perſpicuity poſſible.

Names and Terms uſed in the preſent ſubject.

The firſt that preſent themſelves are taken from the conſtituent parts of a face; as, the eye, the noſe, mouth, chin, forehead, ear, &c. The ſecond comprehend two common terms.

The firſt, which regards the exact diſtance of the forehead, noſe, and chin, with the right ſituation of eye, mouth, and ear, is called Proportion: the other relates to the peculiar formation of the noſe, mouth, eye, and chin, &c. and this is called the Features. Theſe compound or complex terms muſt be noticed for the uſe that is made of them.

AXIOMS.

An axiom is a maxim or principle generally and indubitably received: now, as mathematics have theirs, I will give mine.

1ſt Axiom—There is no proportion without the parts proportioned.— 2. The likeneſs of a face preſuppoſes another reſembling it.— 3. There is not a perfect totality of likeneſs, without the likeneſs of all the parts.—4. If two faces perfectly reſemble a third, the reaſon of this likeneſs will be the ſame in both.—5. The ſame proportion obſerved in a larger ſpace, may be obſerved in a leſs.

FIRST PROPOSITION.

Two faces, having the ſame proportions and features, are alike.

DEMONSTRATION.

To render this Propoſition palpably evident, I place before the ſight two faces, A B, in the following figure; and ſay, theſe two faces have the ſame opening of the eyes, the ſame ſhape of the noſe, the ſame formation of mouth, chin and forehead, and are in the ſame proportion as the ſquare ſhews; and no other reaſon can be given of their exact likeneſs: therefore two faces having the ſame proportions and features, are alike. See Fig. 7.

Corollary.

In examining whether a picture is like life, it is often ſaid, "There are indeed the "ſame features; it is a well made head, "well deſigned; yet, methinks, ſomething "is deficient in point of likeneſs, I cannot "tell what." No, rather ſay, likeneſs is deficient; becauſe either the perfect ſameneſs of features is wanting, or the features are not under the ſame proportion as in nature; for if one and the other were there, they would be alike, as appears in the foregoing figure, and will appear in the following,

ing, which I preſent to realize the aſſertion. Fig. 8.

REMARK.

As there are faces that have not the uſual regular proportions, it is therefore to be obſerved that, if a face before you be in any manner irregular, the ſame irregularity muſt be preſerved in the copy, if you wiſh to exhibit a true likeneſs. This remark will not be deemed uſeleſs; for there have been ſometimes even artiſts ſo ſcrupulous in keeping the uſual regular proportions, that they have not dared to quit them in taking off a face marked with ſome notable diſproportion; and that is the very reaſon of the likeneſs failing; which is very natural, as the original ſtruck the eye of the beholder with this irregularity, be it great or little: if this is wanting in the copy, that will be deficient which ſtruck the eye in the original,

nal, and conſequently ſomething will be wanting eſſential to the likeneſs; on the contrary, if all is obſerved that ought to be done, the two faces will both be equally ſtriking, as is ſeen Fig. 9.

SECOND PROPOSITION.

If two faces have different features, though under the ſame proportion they will not be alike.

DEMONSTRATION.

Though this Propoſition be as indubitably true as the former; to make it moſt viſibly ſo, I produce the two faces A B in the tenth Figure: I ſay, the traits or features of the firſt face are different from thoſe of the ſecond, becauſe the firſt has a round forehead, the ſecond a flat one; the firſt has an aquiline noſe, the other's is ſtrait; the upper lip of the firſt recedes, the lower advances; the ſecond is juſt the reverſe: the eye of the firſt is open, and the eyebrow raiſed; the eye of the ſecond is more cloſed, and the eyebrow lower. Moreover, it is clear to the ſight, that the two faces are not alike: therefore, if two faces have different features, though under the ſame proportion, as theſe are, they will not be alike. Fig. 10.

COROLLARY.

It is not neceſſary that every feature ſhould concur, to make a difference betwixt two faces; it is ſufficient that the noſe and eye differ, or one only of the two features: and as artiſts are divided in opinion, which of theſe two moſt characterizes a face, I will give mine. I might allow that, in a face in profile, the noſe commands diverſity or diſtinction, being moſt conſpicuous by its prominency;

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prominency; but in a fuller face, where both eyes appear, and the noſe loſes its projection, I believe reſemblance ariſes moſt from the eyes, not only becauſe they are, as it were, the ſoul of the face, but alſo becauſe they are the firſt ſeen; as it happens in looking into a glaſs, where the firſt thing we behold naturally, and without reflection, are our own eyes. What is certain is, that, if two faces agree in the other features, and differ only in the noſe and eyes, they will never be alike, as may be ſeen Fig. 11.

REMARK.

To ſucceed in taking likeneſſes, you muſt accuſtom yourſelf to make different-formed features of all kinds, as is ſeen in nature; thus imitating thoſe who ſell falſe eyes of glaſs to thoſe who have loſt a natural eye; in their ſhops you will find eyes of all kinds, big, little, full, ſmall, round, and narrow, cheerful, dull, black, and blue, to ſuit the deficient, and reſemble the natural one. This you muſt aim at, and imitate eyes of all kinds with your pencil. So, in regard to noſes, you muſt be able to take off a round, pointed and ſharp, crooked, flat, prominent noſe, and ſuch as appear depreſſed and broken. So you muſt practiſe upon the other features, not to be like ſome one who made the ſame features in all faces he aimed to copy, and thus found himſelf puzzled to hit off a true likeneſs. Wherefore I propoſe two other faces, of different features, for ſake of exerciſe. Fig. 12.

REMARK.

All I have ſaid tends, firſt, to evince that likeneſs conſiſts in ſimilar features and ſimilar proportion; and, ſecondly, to take an exact copy of a head in profile, if made in a ſquare.

Now we muſt learn to copy a head when it is not in a ſquare. The way is, merely to place it in a ſquare, ſince it has not one. To do this, obſerve theſe directions.

Always fix the point of conjunction of the noſe at the upper part of the ſeparating of the mouth, and from thence draw upwards and downwards a perpendicular; and croſs it horizontally below the ear, and again through the opening of the eyelid, and over the upper part of the ear, and one perpendicular to form the Square 2; and if you draw two other horizontal lines, one below, the other above, you will have the three principal Squares, 1, 2, 3, as in Fig. 13.

Whoſoever is accuſtomed to draw heads in ſquares of ſixteen equal parts, will find no difficulty to make in the foregoing figure the ſmall ſquares that are wanting; and, even without making them, you may copy with the eye alone the reſt, which is leſs eſſential to the likeneſs.

All then that is neceſſary to be done, is to form on your paper a ſquare divided into ſixteen parts, and to copy exactly what is contained within and without in the three principal little Squares, 1, 2, 3, as in the original; and it will appear that not only a copy is taken, but alſo a perfect reſemblance, as is ſeen Fig. 14.

Of a Head containing three quarters of a Face.

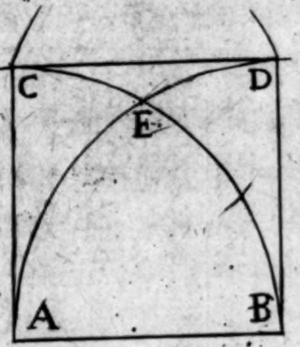
Enough, I believe, has been ſaid of a profile, which is the baſe and foundation of my ſyſtem. As then we ſee almoſt all portraits a little turned beyond the profile, that is, about three quarters of a face, we muſt alſo give ſome eaſy rules, firſt to make a ſimilar face with the help of the ſquare, with a little change indeed, but no great intricacity; ſecondly, to form a ſquare upon a face that is to be copied, if it has not one.

Firſt, the profile being, in my opinion, the beſt means to take a likeneſs readily, you muſt begin with the profile to form a face that is to appear fuller, thus: Slightly ſketch or dot out the profile, as in Fig. 13. then, from the top of the head, widen the forehead one half of the Square 4, in a line with the eyebrow; draw back inwards a little, for the hollow about the eye; advance again outwards at one half of the Square 5, for the cheek; and deſcend inſenſibly to the Square 6, to end with the chin. The firſt eye is made in the Square 1, by finiſhing the eyelid, which in the profile appeared but one half, and making the ball of the eye rounder; and for the ſecond eye, make an equal eyebrow, lid, and pupil, near the cavity betwixt the noſe and forehead. Next, diminiſh a little of the noſe, add more to the mouth, bring the ear nearer, and the contour of the head and neck one half of a ſquare; and thus a face will become fuller, which was only a profile, as is ſeen Fig. 15.

To try whether this rule favours my ſyſtem, you need but make two fuller faces in one ſquare, as A B; the one formed by the profile, and the other a copy of the firſt; and both will appear alike, as in Fig. 16.

There might be required at preſent ſome rule to incloſe in a ſquare a fuller face, which is not repreſented under a ſquare; but, as this differs not much from that which I gave when ſpeaking of a profile, it is unneceſſary to repeat the ſame things; only I wiſh it to be remarked, in regard of what will be ſaid in the Second Part of my work, that, in drawing the firſt perpendicular, it muſt not only paſs through the point of the conjunction of the noſe, where it is ſeparated from the mouth, but alſo by the little hollow that is placed betwixt the forehead and the beginning of the noſe; becauſe, if by chance the face intended to be copied is not perpendicular, but a little raiſed, the principal line, and conſequently all the reſt, muſt be inclined. The two following figures will ſhew my meaning: in the firſt you ſee the ſquare formed on the face; and in the ſecond is ſeen a viſage like the former. And this is ſufficient for this Firſt Part. Let us paſs to the Second, which will teach taking likeneſſes after nature. In the mean while, examine the two Figures 17 and 18.

F1



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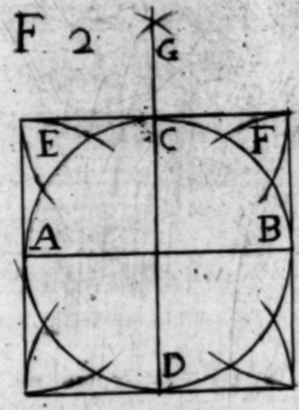

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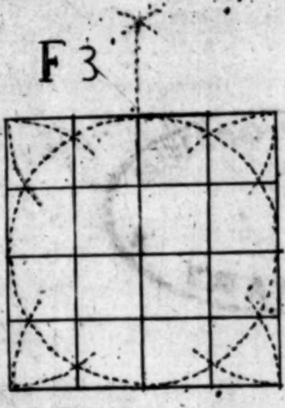

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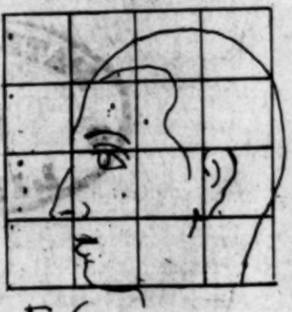

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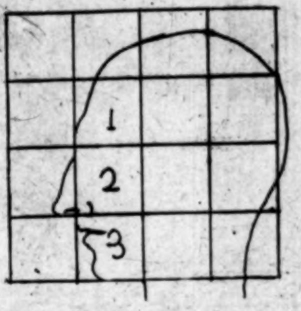

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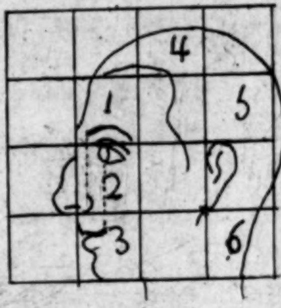

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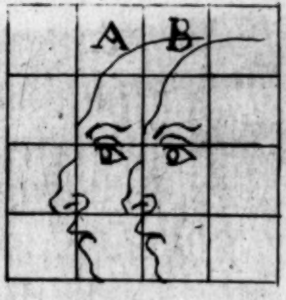

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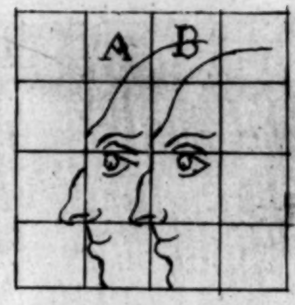

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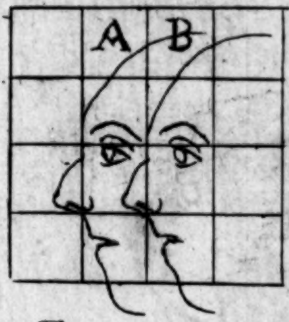

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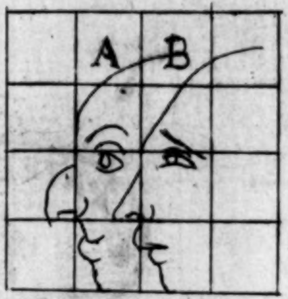

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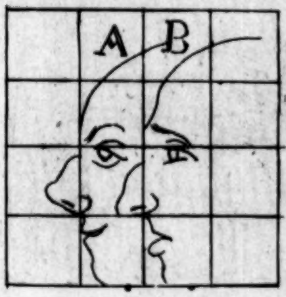

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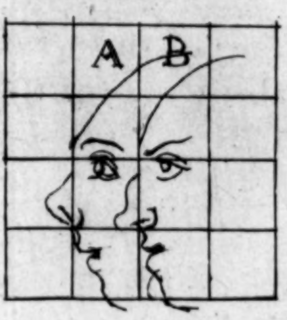

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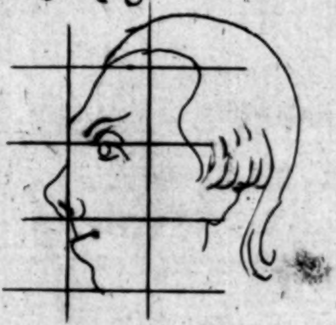
F. 13



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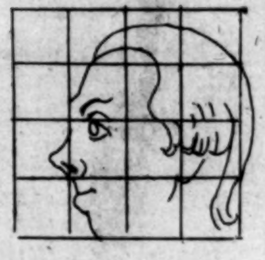

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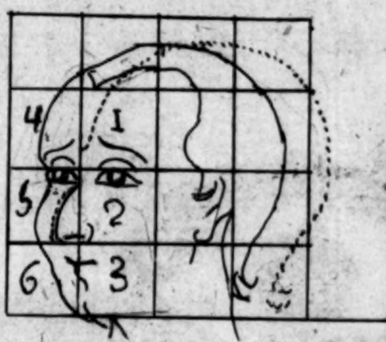
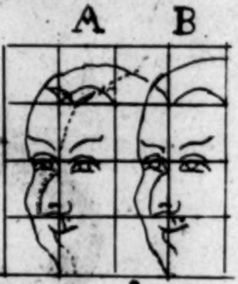
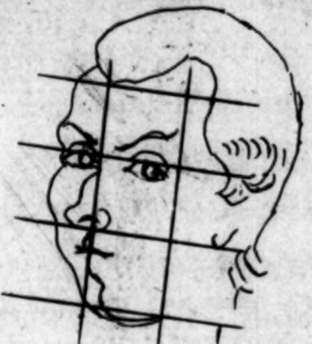


F 16.





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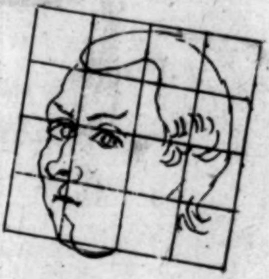

F 18

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SECOND PART.

PRELIMINARY.

I FLATTER myſelf that I have given in the Firſt Part ſufficient rules for copying an exact likeneſs from an original drawing in a ſquare, or acroſs which a ſquare with its ſixteen diviſions has been drawn. I now propoſe giving rules to take a likeneſs, not from a painting or drawing, but from life; this being the chief object of all lovers of the art who wiſh to take off with exactneſs a living figure. And as, according to my plan, we muſt know how to place a real head under a ſquare, I will therefore ſhew, in the propereſt and moſt ſuitable manner, how to execute this, which at firſt appears inconvenient and ridiculous.

Previouſly I entreat the curious to follow me ſtep by ſtep to the auguſt temple of Perſpective, without being alarmed at the name of an art which, as agreeable as it is to thoſe who poſſeſs it, is not leſs difficult to be attained in perfection: and if in the Firſt Part I was found intelligible to thoſe who know not the art of deſigning, I will now make myſelf underſtood by thoſe, alſo, who know not the laws of Perſpective. Therefore I confine myſelf to give as clear as poſſible the firſt notions of this art, and thoſe, namely, which are moſt analogous to the rules calculated for taking a likeneſs from nature.

Definition of Perspective.

Perſpective is nothing elſe but the art of repreſenting upon a plain, on paper, canvas, or a wall, any object preſented to the eye, and that by means of the ſection of the viſual pyramid, compoſed of viſual rays, which, making an angle in the eye, are bounded by the object.

To underſtand this long definition, we muſt explain with order, firſt, what is underſtood by Viſual Rays; ſecondly, by the angle formed in the eye by theſe ſame rays; thirdly, the meaning of the Viſual Pyramid; and laſtly, this ſection of the Pyramid. This ſhall be done in four little paragraphs.

VISUAL RAYS.

Theſe are imaginary lines, ſuppoſed to come from the eye, and to reach to the extreme ends of the object ſeen: thus the eye A, in Fig. 1, viewing the object B C, forms two rays A B, and A C, terminated by the two extremes B C. Clear as this is in itſelf, it may appear more clear by a compariſon taken from the light of a candle; for, as from this light rays proceed to enlighten the object, ſo from the eye there go forth viſual rays, that terminate at the object, to make it viſible. See Fig. 1.

VISUAL ANGLE.

This is the angle formed in the eye by the meeting of the two viſual rays, which continue widening themſelves, to take in the object, of which they ſend back the image to the eye: this angle is now larger and greater, now narrower and leſs, as the objects are greater or leſs in the ſame diſtance. Let there be two objects, B and C, equidiſtant from the eye A; the one, the head of a large man; the other, the head of a little child. It is certain the firſt object forms in the eye a greater angle, being greater itſelf, the ſecond a leſs one, being leſs in itſelf; and if, inſtead of a child's head, there were a head equal to the firſt, the angles would be equal, as is clear. See the figure. Fig. 2.

The ſaid viſual angle is greater alſo or leſs, according to the greater or leſs appearances of objects ſeen at different diſtances. Let there be the two heads B C, placed at different diſtances from the eye, A. The firſt, B, makes a greater angle in the eye, its appearance being greater by its proximity; the ſecond, C, forms a leſs angle, its appearance being leſs by its diſtance. Hence is explained and underſtood how objects diminiſh in proportion to their diſtance, becauſe the angles under which they appear, leſſen as the objects are further removed. See Fig. 3.

VISUAL PYRAMID.

From the foregoing doctrine we muſt imagine that not two rays only paſs betwixt the object and the eye, but many and innumerable; ſome, that incloſe the ſame object without, called the extreme or external rays; and others, that riſe from every inward part of the ſuperficies, named the central and internal rays. Thus betwixt the eye and the object is formed a pyramid, the apex of which is in the eye, and the baſe is in the object; and this is what we term the Viſual Pyramid. See the appearance in the following figure, where the number of rays is much limited, to avoid confuſion. Fig. 4.

The Section of the Viſual Pyramid.

As each object remits to the eye its image by the viſual rays that form the pyramid, ſo, in whatſoever part this pyramid is cut, or is ſuppoſed to be cut, there muſt be in the ſurface of each ſection a juſt and true image of the object. I give an example of this by a piece of glaſs, in which this ſection is formed, being placed betwixt the eye and its object, as the piece of glaſs in the following figure A. It is certain that this tranſparent inſtrument divides the air between the eye C and object B; conſequently it cuts the ſtream of rays paſſing from the eye to the object, and the flow or ſtream of rays of the image paſſing from the object to the eye: alſo, certain it is that the eye ſees in the above glaſs, not the object itſelf, becauſe the object is not in the glaſs, but the true and exact image of the object; ſo that, whereſoever you place this glaſs, nearer or further from the eye, the eye always ſees the ſame image, which appears to contract itſelf, as it ever tends totally to concentre itſelf in the eye. This appears in the following Figure 5.

You muſt not ſit down contented with underſtanding theſe documents: you muſt bring them to the teſt of your own experiments, to become expert in the practice of thoſe rules I intend to give in the ſequel. Previouſly, then, procure a piece of fine tranſparent linen or gauze, well framed and ſtretched; and being diſtant two or three feet from a perſon, place betwixt your eye and the party this veil or ſaſh; draw with a light and ſmooth pencil the contour of the head, as it appears; then advance the inſtrument nearer, and make near the firſt head another head, to ſee how much leſs it will be.

By this experiment we may ſee that, if the intermediate tranſparency could receive very ſmall and fine lines, and were immoveable, the head and the eye remaining alſo immoveable, the ſmalleſt miniature, even to fit a ring, might be taken. The following figure will ſhew how to proceed in this experiment. Fig. 6.

Since then the pyramidical ſection of ſight may be made with a piece of glaſs, or with tranſparent linen; ſo I propoſe forming this ſection with a wooden frame, and dividing its inward ſquare into ſixteen equal parts by means of ſix black ſtrings of tape, three perpendicular, and three horizontal. Now, as theſe threads, and the intermediate air betwixt each thread, make the ſection of the viſual pyramid; and as this inſtrument is the moſt intereſting and uſeful in my ſyſtem, I give in the following figure, not only its ſhape, but alſo the exact dimenſion to make one by it; and it will be found highly uſeful in the ſequel. At the ſame time, I lay it down as a general rule, that the interior width of the wooden ſquare ſhould not exceed two inches, two lines; and that the thickneſs of the tape ſhould not be more than half a line of an inch, leaving it to choice to employ either black tape, or wire blackened, to prevent its ſhining. Thus you will have a portable and very durable inſtrument. See Fig. 7.

The Uſe of the propoſed Square.

This ſquare is placed betwixt the eye and a real face turned ſideways, or in profile; removed from the eye of the artiſt one foot, from the perſon before you two paces, keeping the other eye ſhut. Next, make for an inſtant the three little principal Squares, 1, 2, 3, correſpond or fall in a line with the parts of the face before you, according to the diviſions marked in the Firſt Part, relating to painting or drawing a face, to wit: Begin by the two horizontal lines, the one of which paſſes under the end of the noſe and the ear, the other croſſes the opening of the eye and beginning of the ear; making the perpendicular and principal line coincide with the uniting of the noſe with the part that ſeparates it from the mouth, and with the hollow or dent that ſeparates the forehead from the noſe. Thus the placing a real head under a ſquare is conveniently effected, as I promiſed to ſhew; for it is one and the ſame to place a living head, or the true image of it, which reſults from the ſection of the viſual pyramid, under a ſquare. See Fig. 8.

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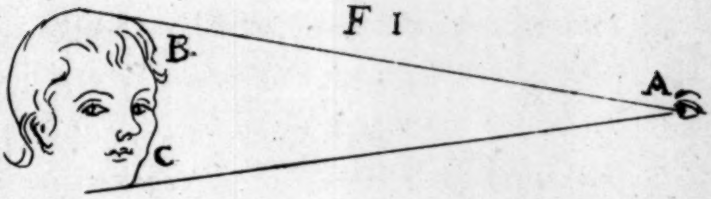

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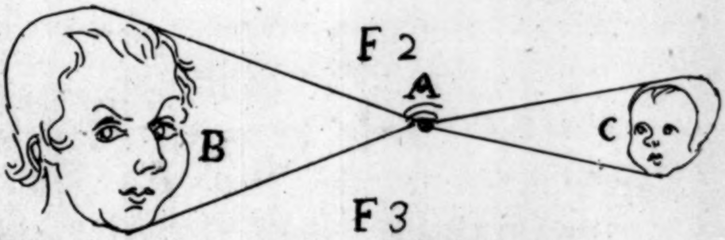

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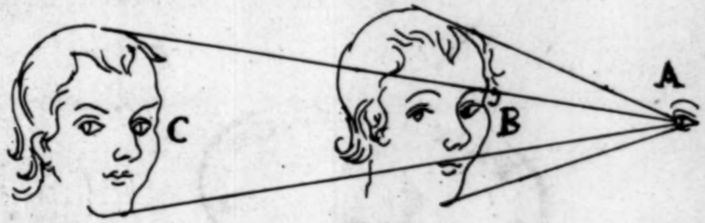

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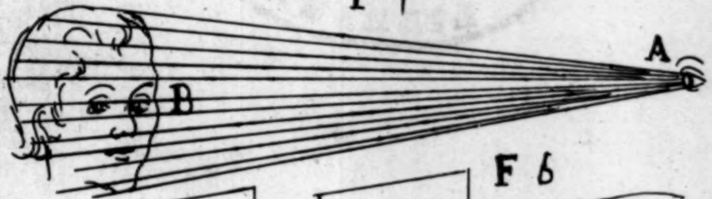

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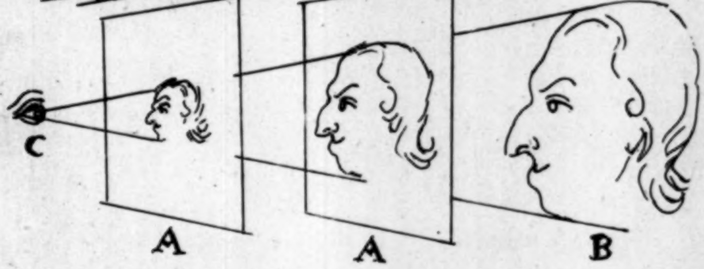

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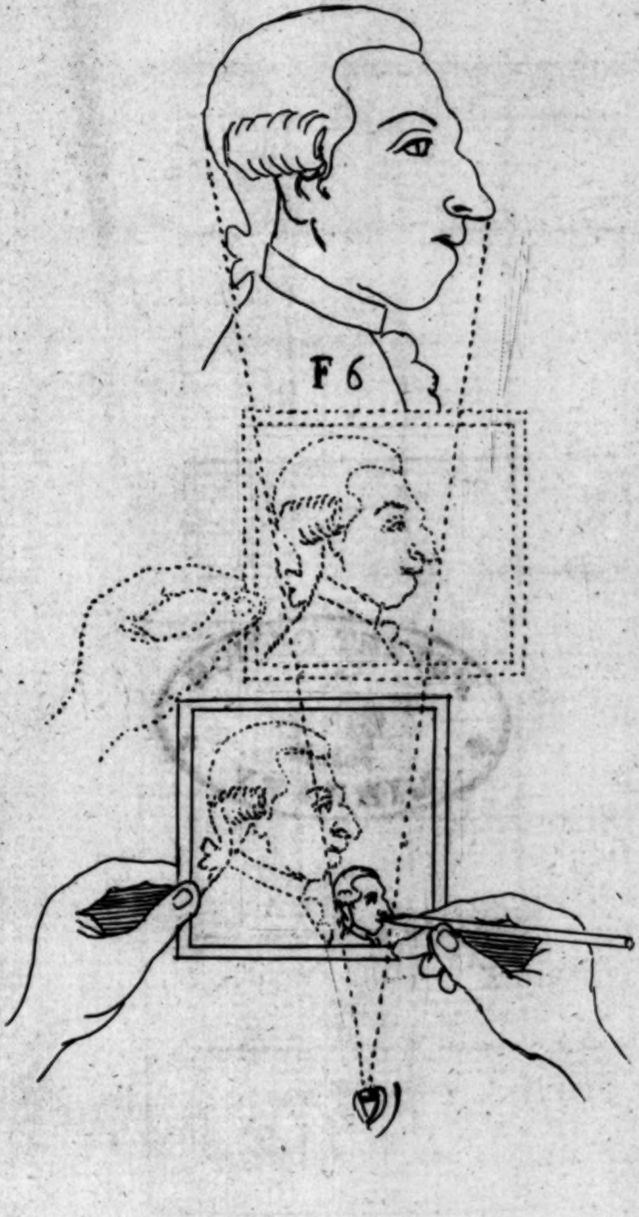

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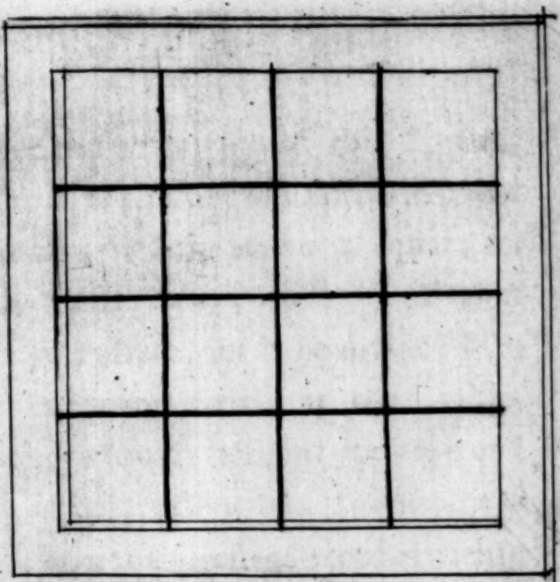

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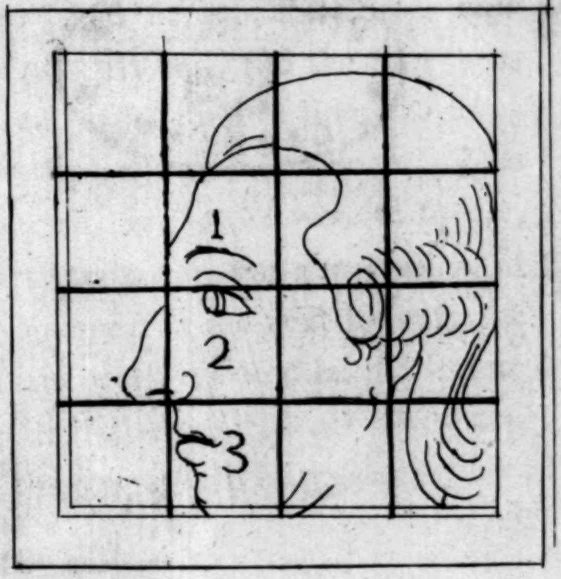

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Utility of the above Square.

To prove the advantage of this Square, let us bring it to the teſt of experiment and demonſtration. Firſt, make a ſquare on paper, canvas, or ivory; make it of what dimenſion you pleaſe; let it be divided into ſixteen leſſer ſquares: then, at your table, place the above ſquare betwixt your eye and the object, as before directed. In a moment you will ſee how the forehead recedes within the principal and perpendicular line, how much the noſe paſſes it, and the chin turns inwards, and what kind of lines the forehead, noſe, lips, and chin, produce. This being obſerved, lower the wooden ſquare, and begin to trace out the above traits in your own ſquare: in the next inſtant, the ſtrung ſquare being replaced in the former point, you will diſcover if, from the noſe to the chin, the proportions be regular; if not, mark it in your ſquare. In a third ſmall ſpace of time, deſcry the quality of the eyes; and in another inſtant, the uniting of the hair with the forehead. In a word, compare the copy with the original; and if any thing is wanting in likeneſs, correct the error by placing the ſquare as before.

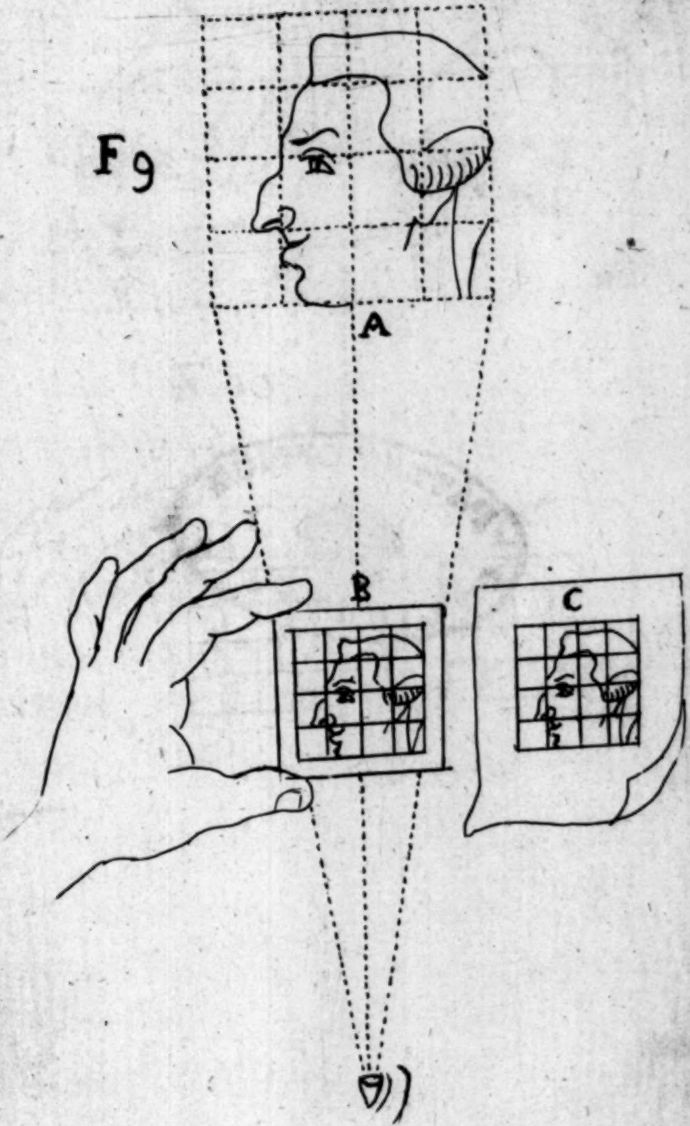
To ſee more clearly the reſult of this method, I preſent an example in the following figure, where, in the ſquare C, will appear a copy of the image B, which is ſeen in the ſection of the pyramid terminating at the object A; and in all three faces the ſame likeneſs will be viſible. This figure may ſerve for the firſt demonſtration of my ſyſtem. Let us paſs to the ſecond. Fig. 9.

I ſaid in the Firſt Part, in favour of unſkilful deſigners, that the way to make a head from fancy turned a little in front, was firſt to make it by the ſquare in profile; then widening this profile on one ſide, and contracting it on the other, as ſhewn, to make it fuller. Now alſo, I aſſert that to effect a likeneſs in a face of three quarters, is to make it firſt in profile, for thoſe, I mean, who are not ready at taking a likeneſs. When then, with the help of the ſquare, a good ſemblant profile is taken (and that is the eaſier way), make the perſon that ſits turn ſo as to expoſe to view the other eye and cheek as much as one half of the little ſquare, having firſt placed again the ſquare in the points mentioned in the Firſt Part; then adding this to the profile with due meaſure and preciſion, it will be ſeen that the likeneſs does not ſuffer, but remains as it was in the profile. The following figure will evince this: here the real face A, a little turned in front, reſembles the real face B, which is already made in profile. The image C, which appears in the ſection of the viſual pyramid, is a true likeneſs of the real viſage A; and the portrait D, made on paper, truly exhibits the above image: ſo that all four are alike. This is the ſecond demonſtration I promiſed: the truth is viſible in the Fig. 10.

REMARK.

There is a circumſtance, and that often occurs, in which the preſcribed poſition of the wooden ſquare does not admit a full ſight of all the features: as, for example, when the extreme diſtance of the noſe to the chin is much greater than that which lies betwixt the end of the noſe and the opening of the eyelid; ſince in this caſe, by placing the wooden ſquare as directed above, a part of the chin remains covered by part of the frame which forms the ſquare, as one may eaſily conceive: and this happens, not from any fault of the portable ſquare, but from the irregularity of the face, which irregularity is not always diſagreeable in itſelf. Then indeed you muſt proceed thus: having traced out the eyes, noſe, and mouth, lower the frame one ſmall ſquare; and making the horizontal line correſpond to the end of the noſe, which line correſponded before with the opening of the eyelid, you will then diſcover, and may conſequently draw the feature lately hidden, as appears, Fig. 11.

F 9



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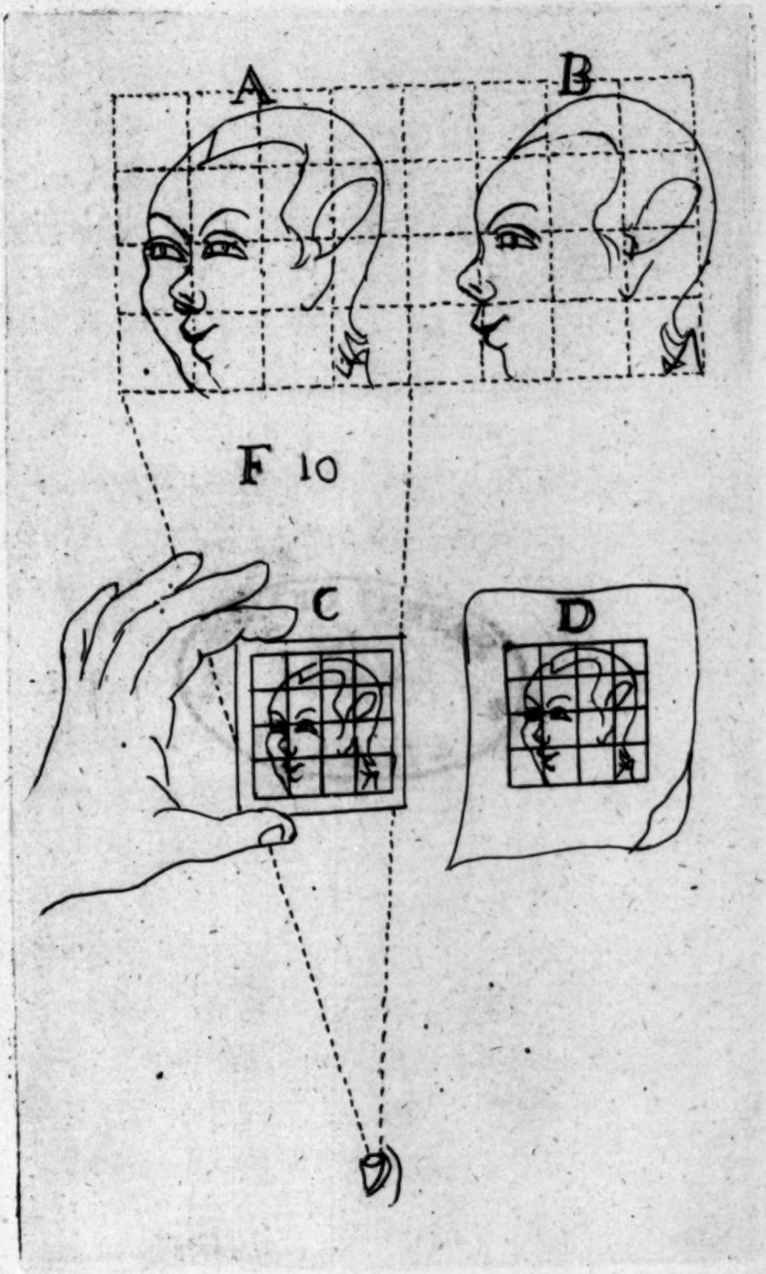
A
B
F 10
C
D

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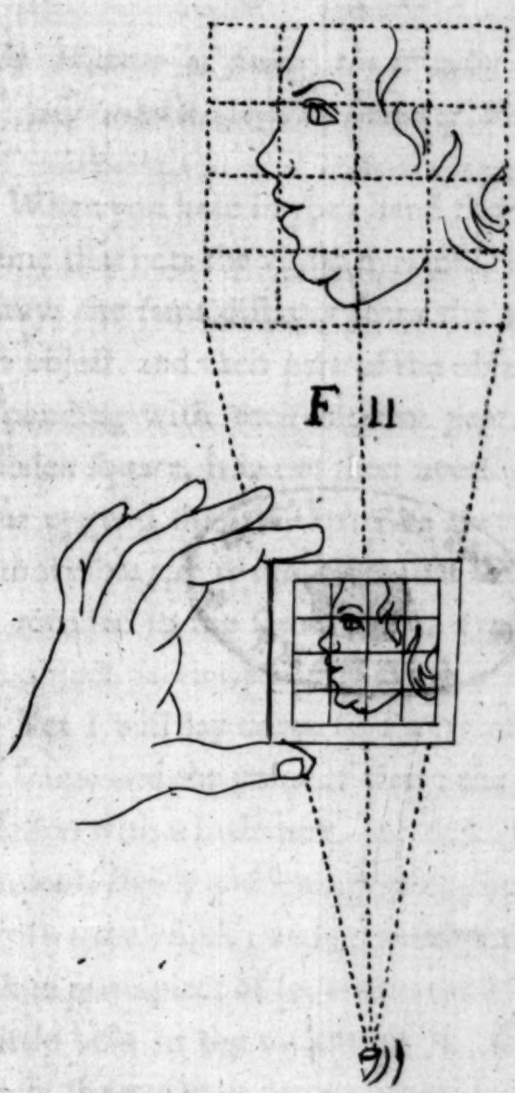

F 11

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The Manner of fixing the Wooden Frame, and determining the Point of View.

When you hold in your hand the wooden frame that cuts the viſual pyramid, keeping always the ſame diſtance from the eye and the object, and each part of the object correſponding with each interior part of the wooden ſquare, it is not then neceſſary that your eye and the ſaid ſquare be always kept immoveable: it is ſufficient that the frame be recalled to the ſame point, every time the object is viewed for taking a copy of it. Yet I will lay down two ways of fixing the frame and the point of view: the firſt is, to faſten with a little wax, or a tack, the inſtrument, ſteady and immoveable, upon the top of a candleſtick; and on another candleſtick to rear a piece of ſquare tin; and to open a little hole in the middle of it, through which the eye may deſcry conveniently all the interior dimenſion of the ſquare; and at the ſame time the perſon, whoſe portrait you are drawing, being placed at a due diſtance, muſt keep the head immoveable a few minutes; then removing further off, or bringing nearer to your ſight, the two ſtands or candleſticks, the points required will be found, as is ſeen in Fig. 12.

The ſecond way is, to form an inſtrument, with a ruler of wood, perfectly quadrangular, one foot in length, which may be doubled in the middle, for the convenience of having it portable, like a Pariſian or Engliſh foot or ruler. Two holes are made at the extremities, A B, to place with the help of a ſwivel the plate of tin on one ſide, and on the other the frame. Moreover, another hole is made in the ruler towards the middle, to tranſport the frame thither, for the purpoſe the following paragraph will point out. A round handle is added to this ruler, either to hold it in the hand, or to fix it like a candle in the candleſtick: if this ruler was joined to the handle in ſuch a manner that it might be raiſed or lowered on each ſide, it would be more convenient to view the object, which is ſometimes higher, ſometimes lower. See Fig. 13.

The Joining of the Buſt with the Head.

If you wiſh to join the head with the buſt, not by the eye, but by a ſure and fixed rule, you may uſe the ſame moveable frame, by lowering it; and bring it about half a foot nearer the eye; as the breadth of the ſhoulders is twice that of the head; and as, by advancing the frame one half nearer, the extenſion of ſight will be double; and thus you will ſee the whole extent of the ſhoulders, as far as one half of the body. The head then being well copied off, make, on your paper or canvas D, a ſquare twice as big, beginning at the chin; then bring the frame B to the eye A, and lower it to the chin, to ſee the width of the buſt C; then trace on your paper the lines diſcovered in the frame; and you will have a well-proportioned and natural buſt, as is ſeen Fig. 14.

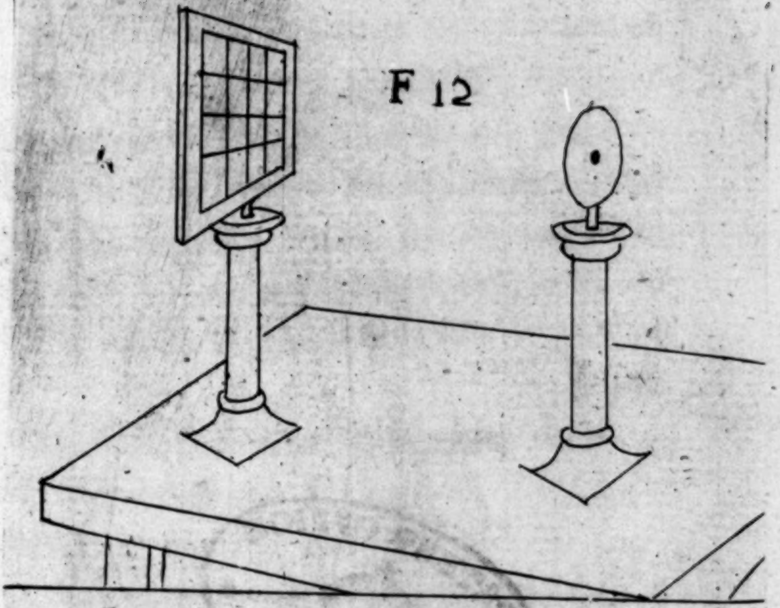
The Utility of the ſame Frame for all Objects.

I cloſe this Work with my laſt demonſtration, to enhance the merit of my frame. I aſſert then, that it is moſt uſeful to exhibit exactly every object that preſents itſelf; and I prove this by the uſual practice of good painters; for, when they wiſh to copy faithfully a large picture filled with figures, and hung high in a church or ſaloon, how does the painter proceed? Having divided the canvas into four parts, he places betwixt his eye and the picture his pencil, ſuſpending it perpendicularly to the middle of the picture, and divides it in two, in order to chalk on his canvas whatever he ſees correſponds on each ſide of the picture thus divided. Next, he carries the inſtrument horizontally, dividing the picture into four parts, to mark on his canvas every correſponding part around this diviſion. Thus he finds the due diſtance of one figure from another, and the proportion of the whole with each particular figure.

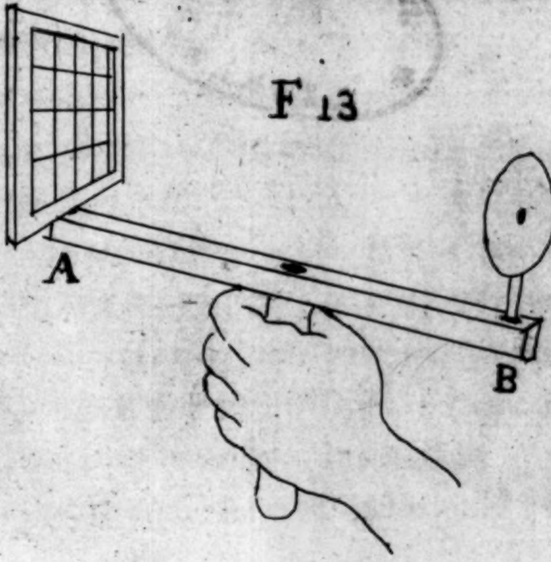
Now if, inſtead of his pencil, he were to uſe the frame I ſpeak of, he would certainly copy the painting with exactneſs and expedition; for, in placing this ſquare betwixt the eye and the object, in ſuch a manner that the two inferior angles of the frame may light exactly on the ſame angles of the picture, he will ſee in a moment the ſame picture divided into ſixteen parts, chiefly in the lower part where the figures are generally repreſented; and whenſoever he has any doubt, by replacing the frame ſo as to coincide with the ſame points, he muſt hit the proportion. The demonſtration will appear clearer by ſeeing the following figure.

From this expoſition, it follows manifeſtly that this frame is very uſeful to copy alſo every natural object, whether a figure, or a building, or a landſcape, either by holding it in the hand, or fixing it as ſhewn above. Fig. 15.

CON-



F 12



F 13

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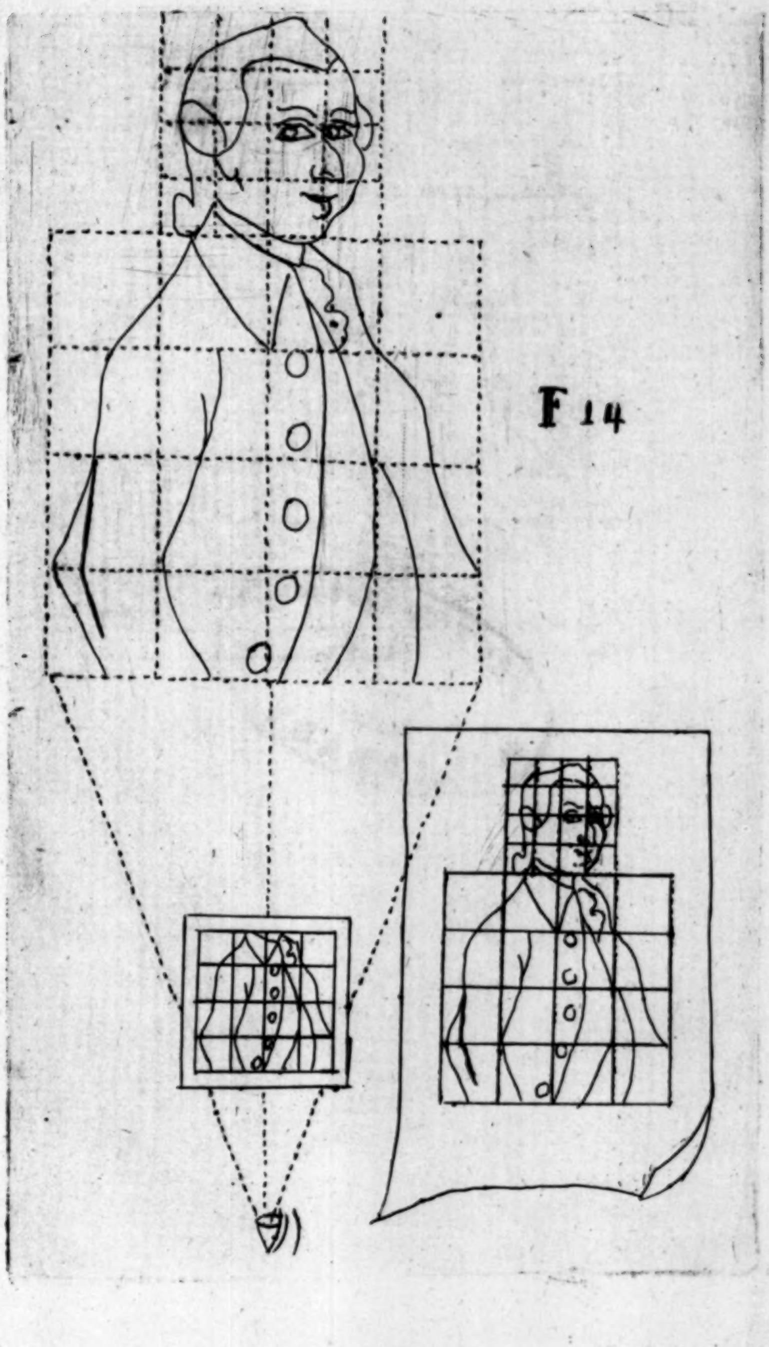

F 14

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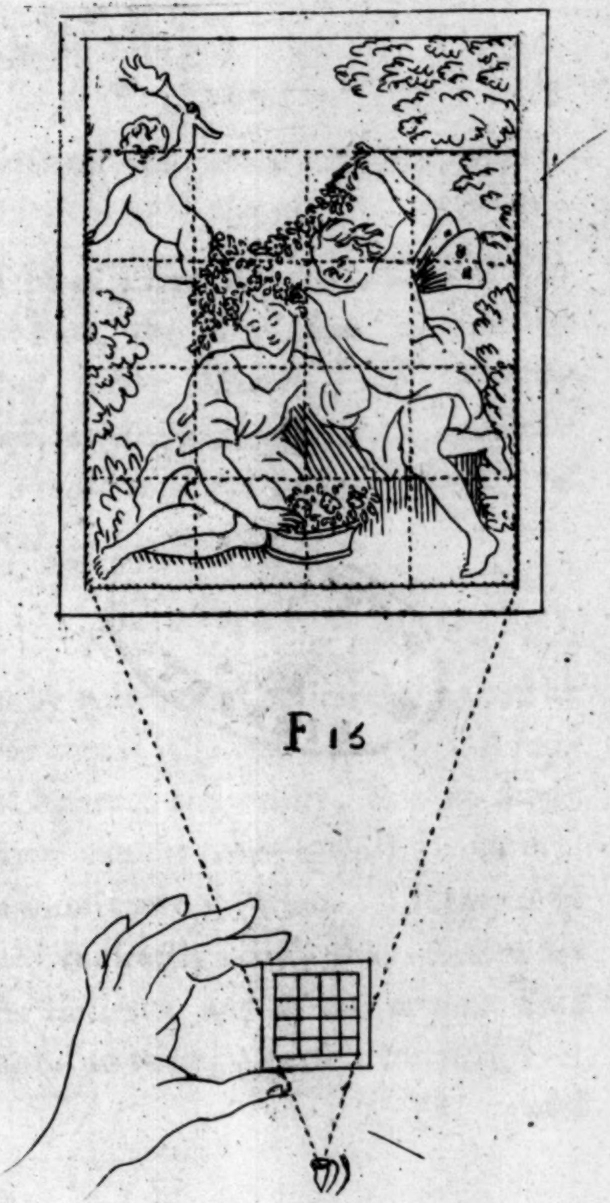

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CONCLUSION;

AND

SOLUTION OF SOME OBJECTIONS.

FROM all I have ſaid, and chiefly in the Second Part, the concluſion is, that *my ſyſtem of taking likeneſſes with certainty and eaſe, conſiſts in the uſe of the moveable frame divided into ſixteen equal parts, and moreover in the practice of forming a profile before a face of three quarters is attempted.* Now, as I have eſtabliſhed this ſyſtem by evident demonſtration, it muſt be allowed that it is ſo well founded and ſupported by truth and utility, that no direct objection can be made againſt it; as evidence admits no oppoſition. Yet may it be oppoſed indirectly: firſt, that whereas no painter hitherto, and at this preſent time ſucceſsful in taking a perfect likeneſs, ever uſed this ſquare, it appears uſeleſs; and conſequently that there is ſome other ſecret method of taking a good likeneſs, not confined to this mechanical procedure.

And, ſecondly, it may be ſaid that it is needleſs to begin a reſemblance by the profile, when a face of three quarters is deſired; and the more ſo, as no painter practiſes this.

To anſwer the firſt objection—I grant, not only no painter employs this ſquare, but that no one ever ſaw me uſe it, who am its promoter. But now, as it is certain that, beſides the mechanical ſquare as propoſed in my ſyſtem, there is an ideal and imaginary one, conſiſting of perpendicular and horizontal lines, ſuppoſed to divide the viſual pyramid in the ſame manner as the artificial ſquare aſſigned by me; ſo good painters, finding the ſecond ſufficient to ſeize a true likeneſs, do not uſe the real one.

Further,

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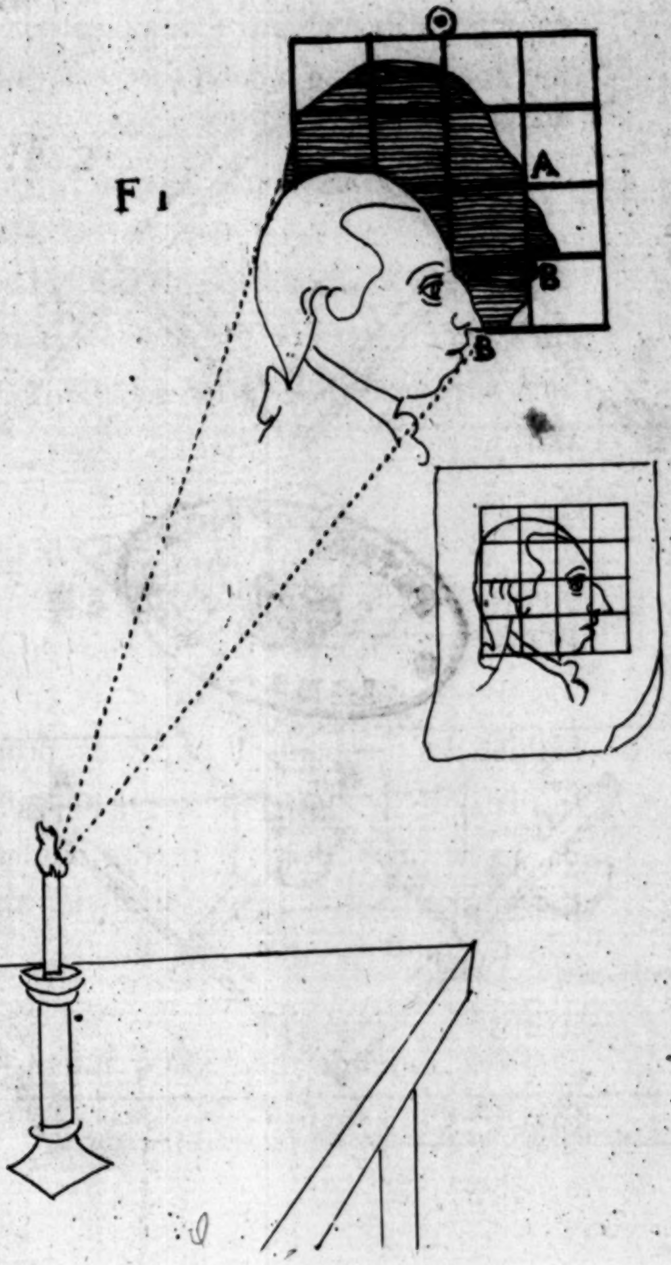

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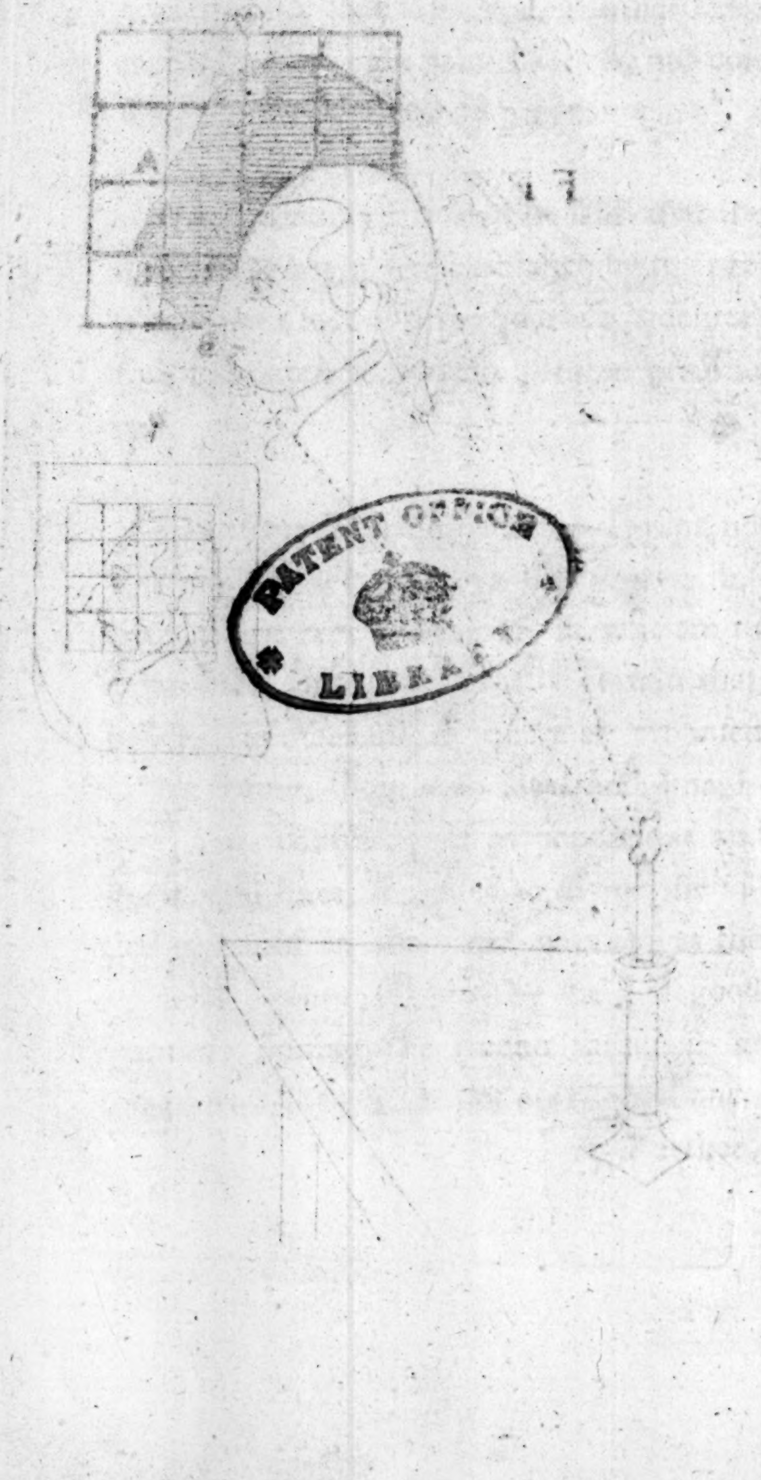

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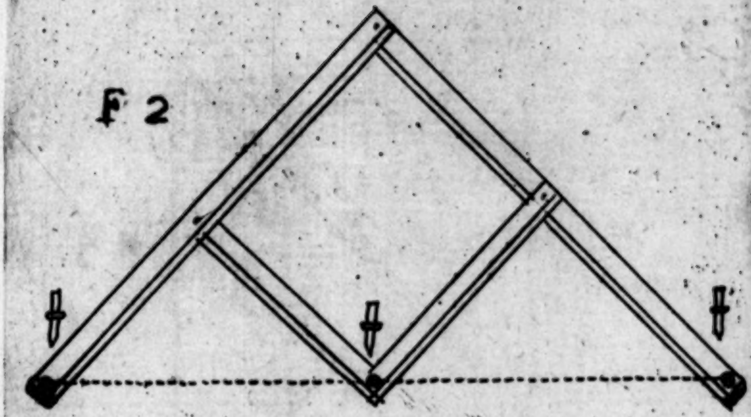

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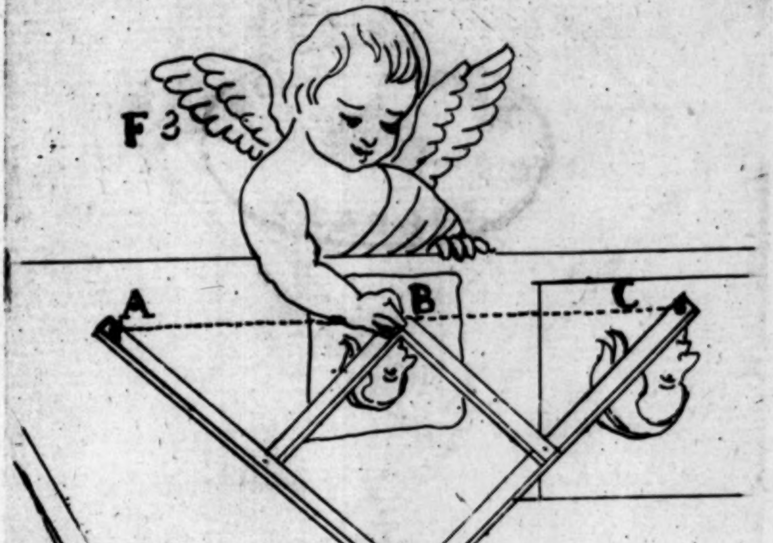

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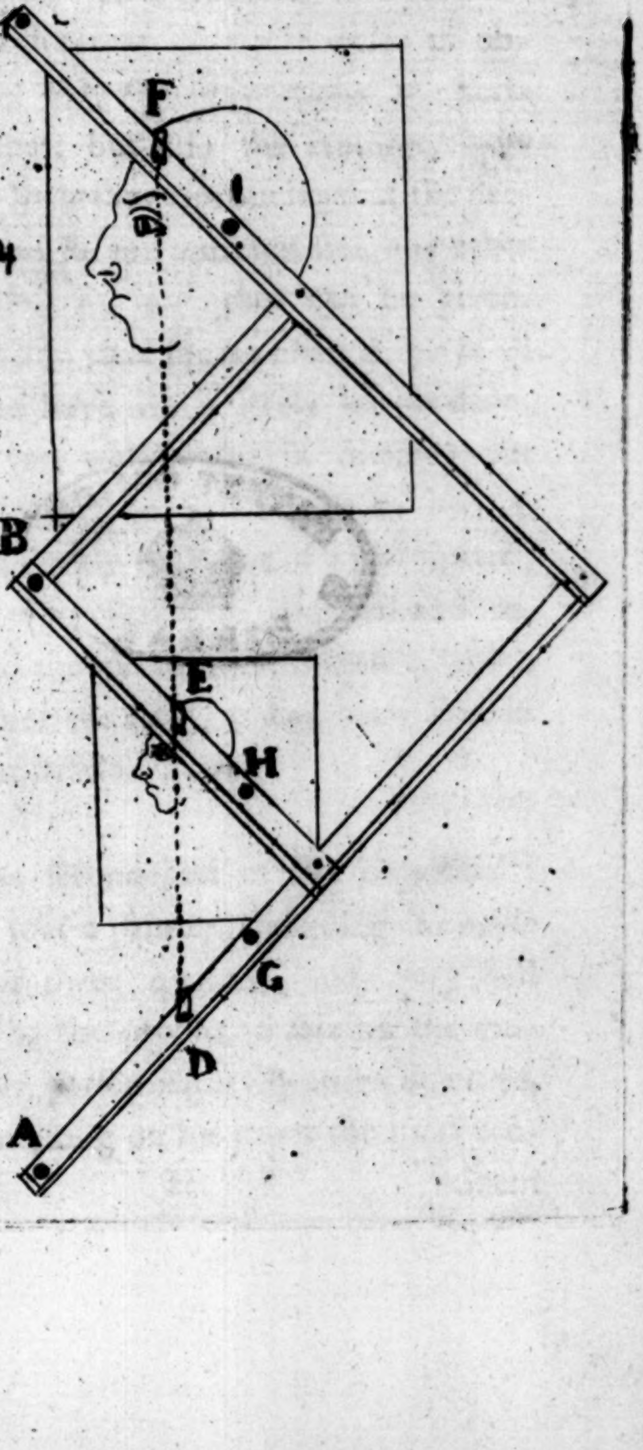
F 4



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Further, as it is neceſſary to all who attempt to take off a likeneſs, to divide the face into different parts, in order to obſerve, not only the proportions by horizontal lines, but alſo the features, how much or little they run out beyond the perpendicular; ſo you muſt not ſeek any other ſecret rule; for no other can be given. Laſtly, as the ideal ſquare often deceives all thoſe who have not a lively imagination, nor are very well verſed in dividing out a given object, nor moreover an eye ſo true as to ſupply the want of a real ſquare; I have every reaſon to propoſe and recommend the uſe of the real ſquare, which deceives not the artiſt, as has been ſeen in the demonſtration I gave.

To the ſecond part of the objection I anſwer, that a painter, deſigning to make a face of three quarters, may very well begin it by the profile, in ſeizing the moment the perſon naturally turns ſideways, and in marking on his paper the moſt prominent and remarkable features, without any one perceiving that he is making a profile: but, though this way be not common, it is not leſs uſeful, as experience has taught me; and I have moreover proved demonſtratively, and ſuch you will find it by ſelf-experience. Thus, I think, I have anſwered the ſtrongeſt, though indirect objection, that can be made againſt my ſyſtem.

APPENDIX.

ALTHOUGH the ſubject I propoſe treating in this addition, is not intirely of the ſame nature as what I have hitherto handled; nevertheleſs, as it regards an eaſy method of taking likeneſſes, and to reduce the ſame from greater to leſs dimenſions, and that without poſſeſſing the art of drawing, I therefore perſuade myſelf I ſhall render a ſervice to the curious in treating it in a manner conformable to my plan, that the reader may better underſtand what he does, and be able to give a ſatisfactory reaſon of his operations.

The Method of taking a Likeneſs by the Shadow, reduced to Syſtem.

As the light of a candle caſts upon a wall in the night a ſhade perfectly reſembling any intermediate body, this method of taking a likeneſs has been adopted. To effect this, a perſon is placed ſideways, a few minutes, near a wall, where the contour of the ſhade is traced upon a ſheet of paper, fixed on the wall; which ſhade, being a perfect likeneſs, is reduced to a leſſer ſize, with the help of a pantagraph, which ſerves to diminiſh or magnify any figure, at the ſame time that it preſerves the features and proportions. I do not condemn this method, provided it be well executed, eſpecially as it tends to prove my aſſertions, that likeneſs is obtained only by keeping the order of features and proportion: but, as this method is imperfect, and that chiefly from the want of the eye, which is the main conſtituent part of a face, I will reduce it to my ſyſtem, both to improve the likeneſs, and to enable the practitioner to give the reaſon of his procedure.

Here we muſt lay aſide the little ſquare that cuts the viſual pyramid, and make on paper another ſquare, a little larger than the natural head, to receive the ſhade of the profile, caſt on the wall. Take then a thick paper, or paſteboard, ten inches in width, for forming a perfect ſquare; divide it into ſixteen parts, and form the lines broad enough to be ſeen afar off, and black enough to ſurpaſs the duſk of the ſhade: fix this on the wall, to the height of the head appearing in profile, one foot diſtant from the wall, and kept ſteady: the light ſhould be three paces from the wall. In this poſition obſerve that the ſhape and lines of the face formed by the ſhade fall in with two principal points of the ſquare: the firſt is the hollow A, between the noſe and forehead, which muſt correſpond with the half of the perpendicular and principal line A, in the ſquare; the ſecond is the end of the noſe B, which muſt alſo correſpond with the the ſame perpendicular in a little ſquare below, marked B; and theſe two points muſt be obſerved even in faces that are not in exact proportion. Now, if you wiſh to take a copy of this profile, having firſt made on paper a ſquare divided into ſixteen parts, of what dimenſion you pleaſe, you muſt ſo place yourſelf as to ſee with the help of the light the deſign already taken, and to diſtinguiſh the principal traits of the ſhade, to trace them out in your little ſquare: it will then appear that the lines you draw are the ſame as thoſe of the ſhadow; conſequently the leſſer profile will be like the greater, with this advantage, that you may there make the eye, which is not ſeen in the ſhadow; and you know on one ſide where to place it, to wit, in the middle of the line of the little ſquare C; on the other, you ſee the form of the ſame eye in the perſon before you, as alſo the make of the mouth, and of whatſoever is within the figure, which is loſt in the ſhadow. Thus a draught in profile is made in a moment; and the paper deſigned for receiving the ſhadow will ſerve for all other heads.

All this is viſible in the following figure, which will ſuffice to convey a proper idea of taking a likeneſs in this manner: the rules aſſigned in the courſe of this work may diſpenſe with further inſtructions, being undoubtedly the beſt directions. Fig. 1.

Of the Pantagraph.

This is an inſtrument for tracing all kinds of figures of different dimenſions, with the moſt exact proportions, and producing a faithful copy, and is now in uſe: this was formerly called a parallelogram, from its four parallel ſides; is now better named a pantagraph, from its univerſal uſe in deſcribing every kind of figure, and of every dimenſion. Now, as there are various ways of conſtructing it, ſome of which make it too intricate,

tricate, too heavy, or too expenſive, I will point out a conſtruction both ſimple, light, and cheap, and alſo ſhew how to uſe it with certainty and eaſe. Firſt, take four ribs of braſs or wood, of the thickneſs of two lines (two twelve parts of an inch), and four broad. The two firſt are one foot long; the two others, each half a foot. The two bigger ſides are rivetted together with a nail, ſo as to admit of being expanded or contracted: the two leſſer are joined in the ſame manner in the middle of the greater ribs, and formed into a perfect ſquare, the oppoſite angles being exactly equal; but this junction is not made with an iron rivet, but with three pins or pegs, the one of which ſerves for a centre to be fixed on a table, the other for a moveable finger to run over all the turnings and windings of the figure which is to be copied; and the third receives the pencil for tracing the copy. In the interim you may examine the figure, to make one like it. Fig. 2.

To learn the uſe of this inſtrument, you may, for the preſent, place as you like the above ſtyles, or pegs, in the holes: for example, place the centre in A, the pencil in B, and the index in C; put the original on that part of the table where the finger is to be moved about, and a white paper where the pencil is to beat; then guiding the pencil with the hand, and keeping the eye fixed on the original, move the inſtrument in ſuch a manner, that the pointed index or finger may run over every turning; and you will diſcover that the pencil, though not directed by the eye, has traced out a figure reſembling the original, one half indeed leſs, as the pencil is here by one half nearer the centre. If you wiſh the draught to be bigger by one half than the original, ſet the index in B, and the pencil in C; and if of the ſame ſize, place the central point in the middle, provided that the three pegs be in a right line, as ſhewn by the three marks, Fig. 3.

As a direction for taking different dimenſions, this general principle of proportions muſt be well underſtood: the copy will be to the original, as the diſtance betwixt the centre and the pencil is to the centre and the finger. Now, taking the centre in A, the diſtance from A to B is one half leſs than the diſtance of A to C; therefore the copy will be juſt one half leſs than the original, as the preceding figure ſhews. From this principle it therefore follows, if a copy is deſired, a third leſs than the original, it is effected by placing the centre in B, the pencil in E, and the finger in F. If required ſtill leſs, place the centre in G, the pencil in H, and the index in I, remembering always to keep a right line, as ſhewn by the little points.

If, inſtead of making the copy leſs than the original, it is wiſhed to have it bigger, it is but placing the pencil where the index is, and the index in the place of the pencil. See Fig. 4.

I have one further obſervation to make; which is, that though I ſaid the hand might hold the pencil in moving the inſtrument, whilſt the index runs over all the contours of the original, the hand may be kept upon the index itſelf: thus the lines of the contours will be tranſcribed with more certainty and exactneſs. In this ſuppoſition, a weight muſt be laid on the pencil equal to the preſſure of the hand, to imprint the marks on the paper; and I think this is the better method.

By help of theſe rules each one may, with the uſe of this inſtrument, and without the aſſiſtance of any other perſon, make the moſt agreeable, uſeful, and perfect experiments and operations, that can be ſhewn, and taught by writing.

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THE END.

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